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Title: Effect of Increased cyclic AMP Concentration on Muscle Protein Synthesis and beta-Adrenergic Receptor Expression in Chicken Skeletal Muscle Cells in Culture

Location: Las Vegas Nevada

Abstract: Analogues of epinephrine are known to cause hypertrophy of skeletal muscle when fed to animals. These compounds presumably exert their physiological action through interaction with the b-adrenergic receptor. Since the intracellular signal generated by the b-adrenergic receptor is cyclic AMP (cAMP), experiments were initiated in cell culture to determine if artificial elevation of cAMP by treatment with forskolin would alter muscle protein metabolism and b-adrenergic receptor expression. Chicken skeletal muscle cells after 7 days in culture were treated with 0.2-30 mM forskolin for a total of three days. At the end of the treatment period, both the concentration of cAMP and the quantity of myosin heavy chain (MHC) were measured. Concentration of cAMP in forskolin-treated cells increased up to 10-fold in a dose dependent manner. In contrast, the quantity of MHC was increased approximately 50% above control cells at 0.2 mM forskolin, but exhibited a gradual decline at higher levels of forskolin so that the quantity of MHC in cells treated with 30 mM forskolin was not significantly different from controls. Curiously, the intracellular concentration of cAMP which elicited the maximum increase in the quantity of MHC was only 40% higher than cAMP concentration in control cells. (Supported by Lilly Research Laboratories, Greenfield, IN.)

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Lay Description:

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